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AN EXPERIMENT IN INDUSTRIAL EDUCATION

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A quarter of a century ago educators of the United States saw clearly the need for industrial education. Their addresses and magazine articles on that subject make interesting and timely reading today. The arguments which we are using were used by them.

As the leaders in educational work were looking about for some plan of handwork which could be brought into the curricula of the schools, two carefully worked-out systems were discovered. These were the Russian system of manual training with its abstract exercises, and the Swedish sloyd system with its perfectly graded series of models.

These forms of handwork with various modifications have been gradually introduced into our schools until today the city system which does not include manual training from its primary grades through the high school is considered unprogressive.

Few will deny that manual training has had a great and beneficial influence upon our education. That it is, however, inadequate as a system of industrial training is evidenced by the great demand for vocational training now arising in all parts of the country. Some of the existing conditions that show the necessity of such training may be briefly stated in the following paragraphs.

The skilled labor of the country is largely foreign born. The supply of skilled workers is far below the demand and our American boys are not being trained to fill the positions. For years we have been saying, "Every boy ought to learn a trade," but we have provided no opportunities for him to learn that trade. As a helper under a journeyman mechanic he has had a chance to pick up a little of the practice but practically nothing of the theory of the trade.

Our schools are failing to hold the boys until they reach the age when the industries want them, and as a result the years of fourteen to sixteen have come to be known as the "wasted years."

Our education is characterized as undemocratic in that it is planned for the small number who are being prepared for higher education. Where our schools do train for the industries the aim is to turn out captains of industry rather than privates in the industrial army.

These and many other equally valid arguments are today presented to us. As a result our manual-training high schools are changing their names to technical high schools; trade schools are being established, and many experiments are being tried in the field of elementary education. The purpose of this article is to describe one such experiment.

In December, 1907, one of the leaders of industrial educational work in this country said to a Rochester teacher, "The way to start a vocational school is not to read books on the subject nor to examine the courses of study of schools already established, but to make an investigation of the needs of the local industries and a study of the 'boy' problem in a given community. The data thus obtained will point the way to the kind of school which your locality requires."

Following this bit of advice an investigation was made by the writer into the conditions and future prospects of the boys in the sixth, seventh, and eighth grades of the grammar schools.

It was found that 14 per cent of the boys of these grades were fourteen years of age or over, were not expecting to enter high school, and were on the point of dropping out to go to work. It was evident, therefore, that any form of instruction which would keep such boys in school for a year or two longer would be of real value. Visits to many of the local factories gave much help as to the kinds of instruction which would best fit boys to get a position quickly and to make rapid advancement after entering the industry. Some of the points mentioned by factory superintendents and foremen were: practice in the use of mathematical principles in actual shop problems; a general knowledge of materials, their kinds, methods of preparation for market, etc.; a clear and accurate working knowledge of the most common tools of the industry and skill in their use, and lastly, the ability to use time to the best advantage.

Following this investigation circular letters were sent to the principals of the grammar schools and to the parents of those boys who might be expected to enter. These letters explained the purpose of the school, the courses to be offered, and the proposed method of instruction. As a result, one hundred boys applied for admission.

During the past eighteen months three vocational schools, two for boys and one for girls, have been established. A brief description is here given of one of these, known as Rochester Shop School No. 34, which was the first school to be established in New York State under the new industrial education law.

The school was organized in an old eight-room school building not otherwise needed for school purposes. Teachers were obtained from various places, i.e., an all-around cabinet maker was secured from a local furniture factory, one teacher with normal and college training was secured for the book work, and an electrical engineer with practical experience was put in charge of the electrical shop.

The school at the present time has four departments: Cabinet-making, Carpentry, Electrical, and Plumbing, with 26 boys in each department—13 in the first-year class and 13 in the advanced or second-year class. This means that not more than 13 boys will be graduated from each department yearly.

The faculty includes a principal, who spends part of his time in teaching, four shop instructors, a classroom teacher, and an instructor in drawing.

The Cabinet-making Department is a complete little factory with its glueing-room, machine-room, assembly room, and finishing-room. In this department there is division of labor, the boys being promoted from one branch of the work to another as soon as a reasonable degree of efficiency has been acquired. Following is a list of articles now being manufactured:

LINE OF PRODUCTS FOR 1910

ELEMENTARY

25 large drawing-boards
100 primary looms
25 pillow looms, with heddles
100 drawing-kits
25 sawhorses
50 sewing-boxes
36 manual-training benches
12 umbrella racks

ADVANCED

50 bookcases, 2 designs
120 desk chairs
20 teacher's sanitary desks
12 music cabinets
Sample line for the following year

Any article to be included in the "line" of products must meet two conditions: (1) it must be something needed in the schools and which the Board of Education would otherwise purchase; (2) it must have educative value for the pupil. Many needed articles are rejected because the making of them would teach the boys little or nothing. The instructor of this department personally directs the work of the machine-room and supervises the work of the other rooms largely through boy foremen. The

COST OF ROCHESTER SHOP SCHOOL

DECEMBER 1, 1908 TO JANUARY 1, 1910

(Including the Summer Session)

	General	Cabinet-making Department	Electrical Department	Total
Equipment	442.76	2,132.62	335.21	2,910.59
Sinking fund (10 per cent of equipment)	44.28	213.26	33.52	291.06
Salaries	1,954.00*	1,965.00	1,250.00	5,169.00
Material	1,078.12	1,746.48	486.97	3,311.57
Drawing supplies	74.95	....	....	74.95
Repairs	257.44†	....	....	257.44
Totals	3,408.79	3,924.74 (1,859.35)	1,770.49 (1,549.44)	9,104.02
Grand totals	....	5,784.09‡	3,319.93§	9,104.02
Credits¶	....	2,631.50	308.14	2,939.64
Net totals	....	3,152.59	3,011.79	6,164.38
Average cost per pupil	....	63.05	60.24	61.64
Average cost per pupil (10 months)	....	52.54	60.24	56.39

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* Includes cost of lighting and heating.

† The general expense is apportioned between the Cabinet-making and the Electrical departments.

‡ Includes the product of the Cabinet-making Department. This department was on a productive basis for nine of the twelve months.

¶ The item of credits gives the value of the work performed by the pupils.

§ Covers the 63 jobs of electrical work in the various school buildings of the city. The Electrical Department was on a productive basis only three of the ten months (October 1 to December 21).

cost accounts of each department of the school are kept separately. The table shows a statement which has recently been prepared for the Board of Education and which shows the cost of two of the departments for the first year.

ARTICLES MADE

200 Bookcases
18 kindergarten tables
32 saw boxes
25 drawing-boards
12 sewing-boxes
100 toy knitters
25 drawing-tables
62 sawhorses
25 bench rests
15 miscellaneous articles
200 looms
700 panels

The following are typical examples of the work done:

October 1—Replacing telephones, School No. 23.
October 15—Installing buzzer, Board of Education office.
November 2—Repairing gongs, School No. 4.
November 9—Installing lights, East High School.
November 17—Repairing fire alarms, School 27.
December 15—Installing spot light, School No. 14.
December 20—Repairing stereopticon, School No. 26.

The Carpentry and Plumbing departments have been in operation less than a year and the expense of maintenance cannot be given. The cost of equipment for these departments would not exceed $300 each.

The carpentry, plumbing, and electrical shopwork taught in the school is much the same as would be taught in any trade school in these branches. The really valuable and vital shopwork however, is the installation and repair work which is being done in the various school buildings of the city by the groups of boys sent out from the shop school. It is often said that no trade can be taught in a school, yet, when the school shopwork is supplemented by the doing of all kinds of real work under the varying conditions which constantly arise, the opportunities for a thorough grounding in the craft are immeasurably increased. This outside work is much more interesting to the pupils than any work which would be constructed merely for the sake of construction and which would have to be torn down. The confidence gained by the boys in attempting and mastering these varying problems plays no small part in their progress. Since the materials used in the outside work are not wasted and the labor performed by the boys has a real value and results in a considerable saving to the city, the cost of instruction in the school is brought down to a very conservative figure.

A concrete example of the outside work may perhaps be interesting. On Monday morning a call comes from a grammar school that the fire alarm system is out of order. That afternoon a group of boys visits the school and locates the trouble. The next morning they make out a bill of materials needed for the repair work. If the job is at all complicated they also make the necessary drawings. As soon as the materials are delivered the same group of boys returns to the school and makes the proper repairs. In many cases this work is carried out under a boy foreman and only inspected by the instructor when completed.

At this moment of writing (March 15, 2:30 P.M.) one group of boys from the Electrical Department is at school No. 33 putting guards on the lights for basket-ball, a second group is at school No. 23 repairing the lighting circuit, and a third group with an instructor is at school No. 13 repairing the intercommunicating telephone system. A group of boys from the Plumbing Department is setting and connecting a sink at No. 34. A group from the Carpentry Department is building teachers' lockers for school No. 25, and a second group is erecting a portable schoolhouse in the rear of the shop school.

In the drafting-room the boys make the designs, working-drawings, tracings, and blueprints of the articles to be constructed in the shops and of the work called for in the various school buildings.

The courses in drawing and mathematics are outlined by the shop instructors to meet the demands of the shopwork. The ideal toward which we are working is this: today the need of some formula is met in the shop; during the next period in the classroom the pupil will have an opportunity to work out this formula. How completely this ideal can be realized is as yet a problem. The effect of this correlation is that the incentives for book work are direct and vital rather than indirect and unappreciated, as is often the case in ordinary school work.

The work of the classroom is largely individual. Since boys are admitted at any time during the year it follows that general class work in some subjects (i.e., drawing and mathematics) is impossible. Pupils will also be graduated at any time in the year at which the course will be finished. The average length of time for the completion of any course will be two years.

This individual rather than class graduation will decidedly simplify the matter of finding positions for the boys as they leave the school. Textbooks to fit the various courses are at present being worked out by the instructors. The time given for the various subjects is as follows:

Shopwork, 15 hours weekly.
Mathematics, 4 hours weekly.
English, 3½ hours weekly.
Drawing, 5 hours weekly.
Spelling and industrial history, 2½ hours weekly.

The school day is six hours in length, except for the groups who go in the afternoon to outside work. For these the working day would probably average 7½ hours.

The question is often asked regarding the attitude of the labor unions toward the school. So far the most friendly spirit has been maintained on both sides. Every effort is made to keep the local unions fully informed regarding the plans and methods of the school.

While it is altogether too early to make any predictions regarding the future of the school or its real value to the boy or the community, it is certain that a school of this type will reach and holds many boys for whom the grammar or high school has no attractions. To such boys a shop course gives a new interest and a new sense of successful accomplishment. The real test of the value of the training, however, will come when the boys graduate and enter the industries.

A careful following of the boy after he begins his life-work and a study of the defects in his preparation will afford most valuable data for the improvement of the courses.